

OSTRACODA FROM THE SKAGERRAK, NORTH SEA (MYODOCOPINA)

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Abstract.—*Doloria sarsi*, new species, is described and illustrated, and a supplementary description is presented of *Philomedes lilljeborgii* (Sars, 1865) from specimens collected in 1865 in the Skagerrak. The synonymy for *P. lilljeborgii* is comprehensive. A key is presented to certain species of *Philomedes*.

The Skagerrak is a broad arm of the North Sea bounded by the southeastern coast of Norway on the northeast, Denmark on the south, and the western end of Sweden on the east. While preparing a paper on the Myodocopina of the Bay of Biscay (in press), I borrowed for comparative purposes from the Naturhistoriska Riksmusset, Stockholm, Sweden, two vials of specimens collected in the Skagerrak that had been referred to *Philomedes lilljeborgii* by Skogsberg (1920:410). Some of the specimens of *lilljeborgii* that I examined from the vials had fewer bristles on the endopodite of the 2nd antenna, the mandible, and 7th limb than on the specimens described by Skogsberg. The differences, as well as some additional characters not mentioned by Skogsberg, are presented herein in a supplementary description. One of the vials, which contained about 130 specimens of *P. lilljeborgii*, also had an adult female of a new species of *Doloria*. Although only the single specimen of the new species was available, its distinctiveness warranted its description. All specimens have been returned to Dr. A. Andersson, Naturhistoriska Riksmuseet, Stockholm, Sweden.

Extensive collections of ostracodes in the Skagerrak by Elofson (1941) contained only four species in three genera of Myodocopina: *Prionotoleberis norvegica* (Sars, 1869), *Philomedes brenda* (Baird, 1850), *P. lilljeborgii* (Sars, 1865), and *Vargula norvegica*

(Baird, 1860). Thus, the new species, *Doloria sarsi*, increases the number of species known from the Skagerrak to five, and the number of genera to four.

One of the common species in the Skagerrak, *Philomedes brenda*, was reported [as *P. globosa*] at station 1101 in the Mediterranean Sea by Granata and Caporiacco (1949:38). Because of some discrepancies in that paper discussed by me in a previous paper (Kornicker 1982:5), I referred the specimens collected at station 1101 to *Philomedes* species indeterminate (Kornicker 1982:5). I later wrote enquiring about the sample to Dr. Christian Carpine, Conservateur des Collections, Institut Océanographique, Monaco, where the specimens reported by Granata and Caporiacco are deposited. She informed me (in litt., 7 May 1986) that *Philomedes globosa* [= *P. brenda*] had been listed erroneously in the sample from station 1101, and that the species listed should have been *Conchoecia inermis* (Claus, 1891). Therefore, I herewith refer to *Conchoecia inermis* the specimens from sample 1101 that had been referred to *P. globosa* by Granata and Caporiacco (1949:38) and to *Philomedes* species indeterminate by Kornicker (1982:5). Although *C. inermis* was not listed at station 1101 by Granata and Caporiacco (1949) on page 38, that station was reported to have the species on page 31. On page 31 station 1101 is listed as having been collected in the campaign of

1991; the year should have been 1901 according to Dr. Carpine.

Philomedidae Müller, 1906
Genus *Philomedes* Liljeborg, 1853

Discussion.—Two species of *Philomedes* have been reported from the Skagerrak: *P. brenda* (Baird, 1850) and *P. lilljeborgii* (Sars, 1865). A supplementary description of the latter is given herein, and a key is presented to species of *Philomedes* having a 7th limb with a terminal end similar to that of *P. lilljeborgii*.

- on inner surface of caudal process;
7th limb with 10–11 pegs
- *P. multidentata* Chavtur, 1983
- Carapace length less than 3 mm and without diagonal bristle-bearing list on inner surface of caudal process;
7th limb with 5–7 pegs 6
- 6. 4th joint of 1st antenna with 3 ventral bristles; 1st endopodial joint of 2nd antenna with 5 bristles
- *P. longidentata* Chavtur, 1983
- 4th joint of 1st antenna with 4 ventral bristles; 1st endopodial joint of 2nd antenna with 6 bristles
- *P. albatross* Kornicker, 1982

Key to Adult Females of Certain Species of
Philomedes (7th Limb with 5 or more
Terminal Pegs 3–4 times
Longer than Wide)

- 1. Dorsal margin of mandibular basale with 3 bristles
- *P. curvata* Poulsen, 1962
- Dorsal margin of mandibular basale with 4–7 bristles 2
- 2. 7th limb with 9–11 bristles 3
- 7th limb with more than 15 bristles 4
- 3. Small process at inferior end of rostrum extending to outer edge of lamellar prolongation of selvage
- *P. tetradens*
Kornicker and Caraion, 1977
- Small process at inferior end of rostrum either lacking, or if present, not reaching outer edge of lamellar prolongation . . . *P. lilljeborgii* (Sars, 1865)
- 4. 2nd endopodial joint of 2nd antenna with 3 bristles
- *P. orbicularis* Brady, 1907
- 2nd endopodial joint of 2nd antenna with 5 bristles
- *P. subantarctica* Kornicker, 1975
- 2nd endopodial joint of 2nd antenna with 2 bristles 5
- 5. Carapace length greater than 3 mm and with diagonal bristle-bearing list

Philomedes lilljeborgii (Sars, 1865)
Figs. 1, 2a–d

- Bradycinetus lilljeborgii* Sars, 1865:112.—Brady, 1868:468; 1872:59.—?Brady and Robertson, 1872:70.—Jones, Kirkby, Brady, 1874:9.
- Philomedes lilljeborgii*.—Sars, 1869:356, 357; 1872:252, 280, 286; 1886:74, 89; 1887:220, 226; 1890:15.—Norman, 1891:119, 121.—Müller, 1893:380; 1894:186, 209; 1897:2.—?Brady and Norman, 1896:658–659, 661, pl. 5:figs. 4–6, pl. 52:figs. 3, 4.—?Gran, 1902:20, 66, 67, 80, 131, 132, 141–146, 151, 160, 161, 209, 210.—Ostenfeld, 1931:611.
- Bradycinetus lilljeborgii*.—Brady, 1871:293.
- Bradycinetus lilljeborgi*.—Brady, 1880:154.
- Philomedes lilljeborgi*.—?Cleve, 1903:24.—Conseil Permanent International pour l'Exploration de la Mer, 1903:210, 286, 287, 306; 1904:25, 50–51, 61; 1906:97.—Ostenfeld and Wesenberg-Lund, 1909:114.—?Apstein, 1911:169, pl. 23:fig. 4.
- Philomedes Liljeborgii*.—?O. Paulsen, 1909:38–40; 1918:18, 20, 21.
- Philomedes lilljeborgi*.—?Steuer, 1910:376.—Sars, 1922:14, 15, pl. 8.—Soot-Ryen, 1927:19.—Klie, 1929:3, 43; 1944:2–4, fig. 4.—Müller, 1931:23 [excluding specimens from Kola Fjord].—Ostenfeld,

1931:641.—?Stephensen, 1938:3, 17.—Puri and Hulings, 1957:171.—Neale, 1965:269.—Puri, 1966:460.—Brattegard, 1967:302.—Carpine, 1970:64.—Hartmann, 1975:577.—Kornicker, 1975:64, 271, 272.—Cohen and Kornicker, 1975:26.—Chavtur, 1983:11, 17, 39, 40.

Philomedes lilljeborgii.—Müller, 1912:XV, 26, 32, 428.—Kornicker, 1975:75–76; 1982:23; 1984:23.—Kornicker and Caraion, 1977:8–12, 15, 19.

Philomedes (Philomedes) Lilljeborgii.—Skogsberg, 1920:2, 349, 350, 354, 365, 366, 369, 375, 384–386, 389, 391, 402–411, 413, 414, 416, 422, figs.70–73.

Philomedes (Philomedes) lilljeborgii.—Elofson, 1941:233, 238–240, 369, 372, 375, 393, 394, 403, 405, 419, 420, 426, 451, 456, 467, 468, 472, 473, 486, 487, 488, 497, 523; 1943:3; 1969:11, 16–18, 139, 141, 143, 157, 165, 166, 176, 177, 181, 200, 203–205, 213, 215, 218, 219, 229–231, 241, 275.

Philomedes bonneti Kornicker and Caraion, 1977:3, 4, 9–15, figs. 6–10.—Kornicker, 1982:23 [key].

Not *Philomedes lilljeborgii*.—E. M. Poulsen, 1962:346, fig. 151.—Darby, 1965:25, 26, 53, pl. 10:figs. 1–11 [= *P. keslingi* Kornicker, 1984:23].

Holotype.—Lost (Skogsberg 1920:409).

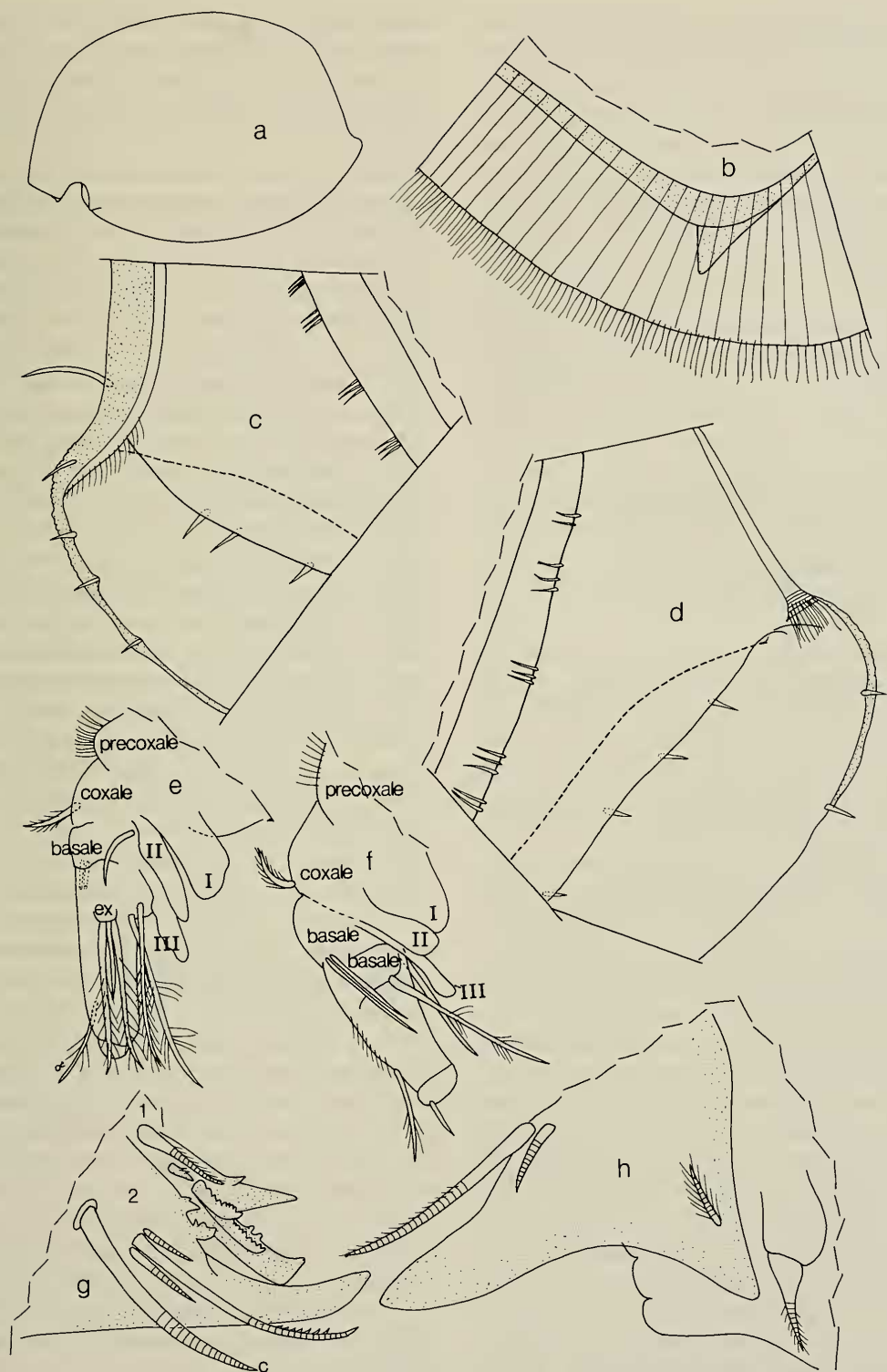
Type locality.—Near Drobak, Christiania Fjord, 110–183 m.

Material.—2 vials in the Naturhistoriska Riksmuseet, Stockholm, Sweden. Vial 1: Approximately 130 juveniles and adult females and the following labels, “125,” “contr. T. Skogsberg,” “*Philomedes Lilljeborgii* (Sars), Koster Fjorden, Lerbotten, 100f, 5.8.1865,” “5/8/1865, Koster Fjorden, 100f.” Vial 2: Approximately 90 ju-

veniles and adult females and the following labels, “129,” “T. Skogsberg cont.,” “*Philomedes Lilljeborgii* (Sars), Skagerak 330 f.l. Lindahl,” a 4th small label having the same information as previous label except Skagerak spelled “Skagerrak.” Skogsberg (1920:410) referred to the sample in vial 1 as “Koster; 5. VIII. 1865; depth 180 m; clay; 130 specimens, mature females and larvae (coll. unknown); R. M. S. 125,” and he referred to sample 129 in vial 2 as one of several samples collected by J. Lindahl without definite localities but at depths indicating they were taken in the Norwegian Depression; depth of the sample was given as 350 m. Skogsberg reported 211 females and juveniles in sample 129, fewer than in the vial I received.

Distribution.—Records of this species are well documented off the western coasts of Norway and Sweden and in the Skagerrak bordering Sweden at depths roughly between 50–914 m, but according to Elofson (1969:16) specimens are usually found at depths greater than 200 m. The species also has been reported southwest of Ireland, off Iceland, the Faeroe Islands, Beer Island, in the Barents Sea, and elsewhere in the North Sea; however, identifications from those areas are not well documented, and I have questioned some identifications in the synonymy. Confirmation is especially needed for Iceland, because the misidentification of specimens from near Iceland by Poulsen (1962:346) suggests that another species resembling *P. lilljeborgii* lives there. Kornicker and Caraion (1977:9) described *P. bonneti* collected off Mauritania at a depth of 1120 m. Except for being smaller, I cannot find a specific character to separate the species from *P. lilljeborgii* as defined herein, and therefore, have referred it to that species

Fig. 1. *Philomedes lilljeborgii*, adult female from vial 1: a, Complete specimen, length 2.24 mm; b, Inferior tip of rostrum of right valve showing triangular process and lamellar prolongation of selvage, inside view; c, d, Tips of caudal processes of left and right valves, respectively, inside view; e, f, Lateral view of left maxilla and



medial view of right maxilla, respectively, not all bristles shown; g, 1st and 2nd exopodial joints of left 5th limb, posterior view; h, 2nd exopodial joint of right 5th limb, anterior view.

(see Discussion). This extends the range of *P. lilljeborgii* south to the continental slope of Mauritania.

Supplementary description of adult female (Figs. 1, 2a-d).—Carapace with slightly convex ventral and dorsal margins and fairly linear anterior and posterior margins (Fig. 1a); anterior edge of rostrum linear or very slightly concave; anterior and inferior corners of rostrum forming close to right angle; inferior corner of rostrum with small pointed process reaching about midwidth of lamellar prolongation of selvage (Fig. 1b); posteroventral corner of valve with small but distinct caudal process projecting posteriorly; minute process present ventral to incisur and just reaching or projecting past valve edge (Fig. 1a); outer edge of caudal process minutely crenulate when viewed at high magnification ($\times 40$ objective) (Fig. 1c, d).

Ornamentation: Carapace with widely scattered long and short slender bristles, some with broad base; about 10 bristles on outside of shell near edge along ventral and posterior margin of caudal process, additional bristles near outer edge of ventral and anterior margins of valve.

Infold (Fig. 1c, d): Rostral infold with about 17 spinous and divided bristles forming single row parallel to anterior edge of rostrum, and 4 shorter and more slender bare bristles along ventral edge of rostrum (bare bristle nearest to inner end of incisur shorter than others); 1 small bristle present on infold just posterior to inner end of incisur; anteroventral infold with 11–14 parallel striae and 16 short spinous bristles forming row (no striae between bristles and outer edge of valve); list with anterior end at base of posterior bristle (of anteroventral row), continuing posteriorly parallel to ventral margin, then bending dorsally away from valve edge (farthest from valve edge opposite caudal process); posteroventral and posterior list with slender bristles forming groups of 1–5. Narrow pocket present at caudal process with 4–5 small bristles along

ventral edge; 1–3 small bristles on infold just anterior to pocket; 3 small bristles at outer edge of caudal process having bases just lateral to selvage (bristles not part of infold).

Selvage (Fig. 1b–d): Broad lamellar prolongation along rostrum and ventral margin of incisur appearing segmented (segments perpendicular to valve edge and with narrow striae), and with marginal fringe; selvage along anteroventral margin with long filaments with bases on lateral side of prolongation at about midwidth; prolongation along ventral and posteroventral margin with narrow striae (better developed in proximal half of prolongation) and marginal fringe; posterior half of prolongation of ventral selvage without lateral filaments and with proximal part defined by its distal edge at about midwidth of prolongation; prolongation along caudal process narrow and without marginal fringe; prolongation along posterior edge of valve dorsal to caudal process narrow and with marginal fringe; on right valve hairs forming tranverse rows just dorsal to caudal process (Fig. 1b–d); on left valve long hairs just dorsal to caudal process parallel valve edge (Fig. 1c).

Size: Sample 125, 2 specimens: 1st specimen, right valve in concavity slide and under cover slip, length 2.24 mm, height 1.51 mm; 2nd specimen, length 2.20 mm, height 1.50 mm. Skogsberg (1920:404) gave length of specimens he studied as 2.15–2.6 mm.

First antenna: Pilosity: 1st joint with medial spines forming rows near ventral margin and more widely scattered spines on medial surface; 2nd joint with medial spines forming rows near and on dorsal margin, a few longer medial spines proximally near ventral margin, lateral spines forming row parallel to distal margin in dorsal half of joint, and few lateral spines forming distal rows near ventral margin. Bristles of limb similar to those described by Skogsberg (1920:406).

Second antenna: Protopodite bare. Endopodite 2-jointed: 1st joint with 6 short

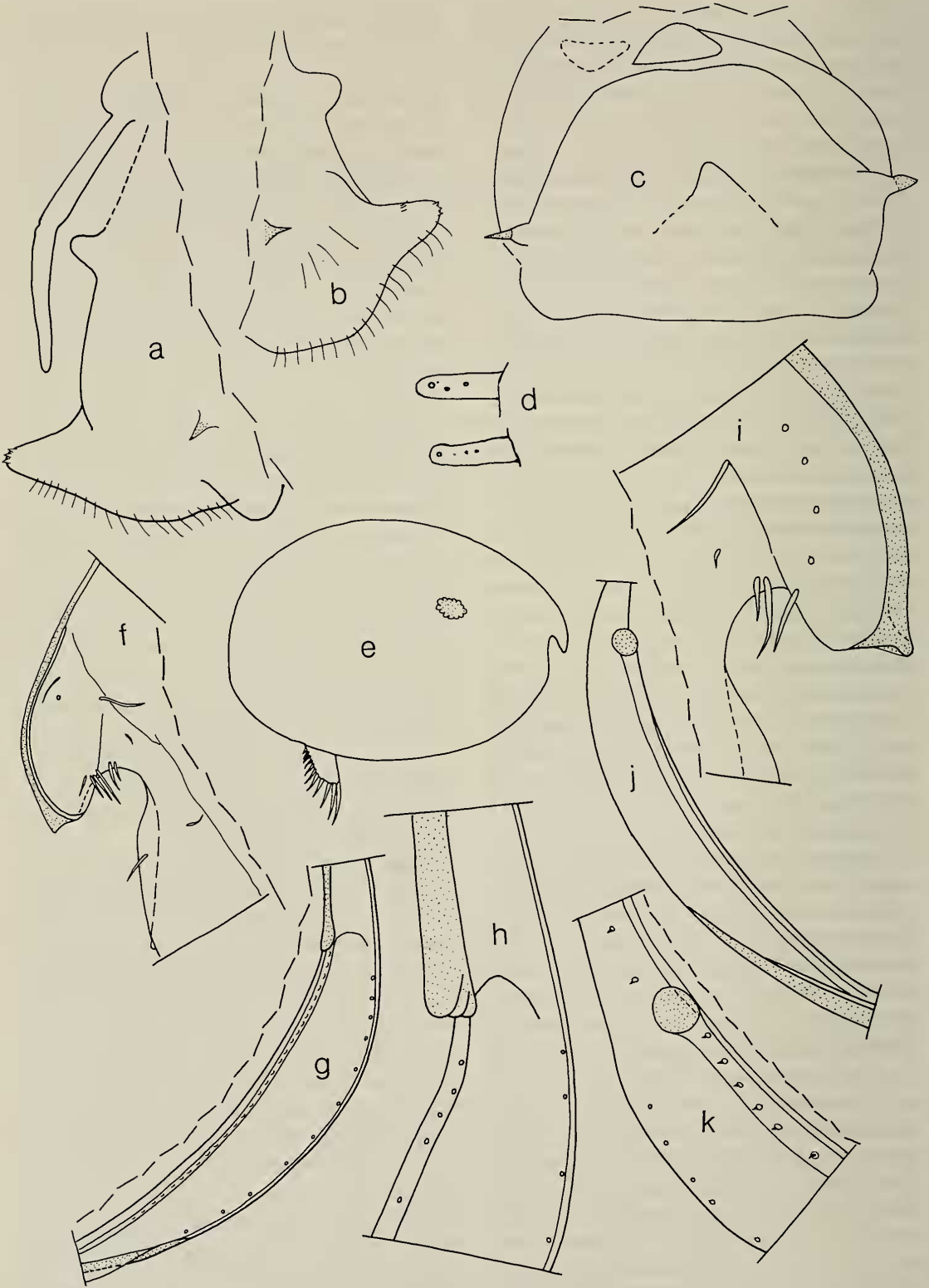
bristles (5 proximal, 1 distal); 2nd joint of left limb of 1st specimen with 1 long ventral bristle (with wreaths of long spines) followed by 2 shorter ventral bristles (without long spines) and 1 recurved terminal filament; 2nd joint of right limb of same specimen with long ventral bristle (with wreaths of long spines) followed by 1 shorter bristle (without long spines) and recurved terminal filament. 2nd joint of left limb of 2nd specimen with 1 long ventral bristle (with wreaths of long spines) followed by 1 short bristle (without long spines), 1 longer bristle with long spines, and recurved terminal filament; right limb of 2nd specimen with 1 long bristle (with wreaths of long spines) followed by 1 short bristle (without long spines), 1 longer bristle with long spines, 1 short bristle without long spines, and recurved terminal filament. Exopodite: 1st joint with small straight medial bristle on distal margin; bristles of joints 2–5 short, without natatory hairs or ventral spines; bristles of joints 6–8 long, with natatory hairs; 9th joint with 7 bristles, all but shorter 1 or 2 bristles with natatory hairs; joints 3–8 with small basal spines (spines longer on distal joints); basal spine of 8th joint about half length of joint; lateral spine not observed on 9th joint; joints 3–8 with short spines forming rows.

Mandible: Bifurcate and spinous coxale endite with small ringed bristle near base; medial surface of coxale with spines forming rows. Basale: dorsal margin with 3 or 4 bristles (with few long spines near middle) distal to midlength and 2 terminal bristles (long bristle with 2 rings of long spines near middle; shorter bristle lateral, about half length of long bristle and about same length as dorsal margin of 1st endopodial joint); lateral side with 5 bristles near or on ventral margin; ventral margin with 3 distal bristles (both lateral and ventral bristles with wreaths of long spines); medial side with 6 proximal bristles (3 stout, pectinate, 3 slender with wreaths of long spines), and long spines forming rows. Exopodite about $\frac{3}{4}$

length of dorsal margin of 1st endopodial joint, hirsute distally, with 2 distal bristles (proximal longer and with wreaths of long spines; distal bare). 1st endopodial joint: ventral margin with 4 bristles, all with wreaths of long spines; medial surface with short spines forming rows. 2nd endopodial joint: ventral margin with 6 distal bristles forming 2 groups, each with 3 spinous bristles; dorsal margin with 11 or 12 bristles near middle forming 3 groups of 4 or 5, 1 (medial), and 6 bristles; medial surface with spines forming rows. End joint: with 3 claws with faint ventral proximal teeth, and 4 bristles.

Maxilla (Fig. 1e, f): Endite I broad, with 8 spinous and pectinate bristles; endite II slender, with about 6 spinous and pectinate bristles; endite III long, slender, with 1 proximal bare bristle and about 10 distal spinous and pectinate bristles. Precoxale with dorsal fringe of long hairs. Coxale with stout hirsute dorsal bristle. Basale with 4 distal bristles: 2 slender, dorsal, and 2 ventral (1 lateral, 1 medial). Exopodite with 3 bristles (1 short, bare, 2 long with wreaths of long hairs). 1st endopodial joint with dorsal spines, 1 alpha-bristle with wreaths of long spines, and 5 slender beta-bristles; bristles of end joint similar to those described by Skogsberg (1920:408).

Fifth limb (Fig. 1g, h): Epipodite with 55 bristles. 1st exopodial joint with 4 constituent teeth; distal tooth bifurcate with large pointed anterior proximal tooth having a smaller pointed tooth near its base (Fig. 1g); bristle proximal to small posterior tooth with short spines; anterior side near outer edge with short stout bristle on small lobe; usual 2 spinous anterior bristles not observed on specimen examined. 2nd exopodial joint with 2 small teeth (both with 1 or 2 marginal teeth) on inner curvature of the large flat triangular sclerotized tooth (Fig. 1g); group of 3 posterior bristles comprising stout pectinate middle bristle with 1 small bristle on each side; c-bristle stout, bare; distal outer corner or large flat tooth with small spinous



anterior bristle (Fig. 1h). 3rd exopodial joint with 3 bristles on inner lobe and 2 hirsute bristles on outer lobe. 4th and 5th joints fused, hirsute, with 5 spinous terminal bristles.

Sixth limb: Epipodite represented by 4 small hirsute bristles. Endite I small, with 2 medial and 1 terminal bristle; endite II narrower and about half length of endites III and IV, with 1 medial and 3 terminal bristles; endite III with 1 medial and 7 or 8 terminal bristles; endite IV with 1 medial and 8 terminal bristles. End joint with 29–30 hirsute and spinous bristles.

Seventh limb: With 9 or 10 bristles: proximal group with 4 or 5 bristles, 2 or 3 on each side, each with 5–6 bells; terminal group with 3 bristles on peg side, each with 4–5 bells, and 2 bristles on comb side, each with up to 6 bells; all bristles with distal marginal spines proximal to bells. Comb with about 13 teeth; each tooth comprising rounded central part with alar projection on each side; alar projection pointed at distal end; side opposite comb with 9 elongate rounded pegs (pegs arranged in ellipse without central peg, but appearing as 2 rows (each with 4–5 pegs) on appendage compressed under cover slip). (Skogsberg (1920: fig 72:14) illustrated limb with 11 pegs.)

Furca: Each lamella with 10 claws; claws decreasing in length along lamella; claws 1–6 with spines forming medial row near base, claws 7–10 without spines forming row; claw 1 of right lamella anterior to claw 1 of left lamella; claw 1 with teeth forming 2 rows and claws 2–6 with single row of stout teeth along slightly concave posterior margins; anterior margins of claws 1–6 convex and

with few or no anterior spines; claws 7–10 with spines of similar size and abundance forming row along linear anterior and posterior margins (claws 7–10 could be considered secondary); hairs present on lamella following claw 10 and also between claws.

Bellonci organ (Fig. 2a): Elongate, cylindrical, with rounded tip.

Eyes: Lateral eyes cylindrical, minute, with few minute cells (ommatidia?) (Fig. 2d). Medial eye without pigment (Fig. 2a).

Upper lip (Fig. 2a–c): Tapering anteriorly and with minute glandular processes at tip.

Anterior of body (Fig. 2a): Rounded anterior process between medial eye and upper lip. Stout, lateral, pointed, spine-like process on each side of body proximal to upper lip (process not previously reported on the Philomedidae) (Fig. 2c).

Y-sclerite: Typical for genus.

Remarks.—A lateral spine-like process on each side of the body proximal to the upper lip has not been reported previously on members of the Philomedidae. However, such processes are visible on an SEM micrograph of *Tetragonodon ctenorhynchus* (Brady, 1887) published by Kornicker and Caraion (1977: pl. 13b), suggesting that the processes might be common but were previously overlooked.

Variability.—Female: Skogsberg (1920: 406) gave the number of ventral bristles on the 2nd endopodial joint of the 2nd antenna as 3 or 4; one of the specimens studied herein has 2 ventral bristles on one limb and 3 on the other; thus expanding the variability of the number of ventral bristles to 2–4. Skogsberg (1920:408) gave the number of dorsal bristles on the mandibular basale as 6 or 7;

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Fig. 2. *Philomedes lilljeborgii*, adult female from vial 1: a, Anterior of body viewed from left side showing medial eye and Bellonci organ, rounded anterior process, and upper lip; b, Anterior of body viewed from right side showing anterior process and upper lip; c, Anterior of body viewed from front showing anterior process at top midwidth, and upper lip (angle near midwidth represents anterior tip of lip); d, Right and left lateral eyes. *Doloria sarsi*, adult female, holotype: e, Complete specimen showing right lateral eye as seen through shell and projecting furca, length 2.67 mm; f, Rostrum of right valve, inside view; g, Caudal process of right valve, inside view; h, Detail from g; i, Rostrum of left valve, inside view; j, Caudal process of left valve, inside view; k, Detail from j.

a specimen studied herein has 5 bristles on one mandible and 6 on the other; thus expanding the variability of the number of dorsal bristles to 5–7. Skogsberg (1920:408) gave the number of bristles on the 7th limb as 10 or 11. A specimen studied herein has 9 bristles on one limb and 10 on the other; thus expanding the variability of the number of bristles to 9–11. Skogsberg (1920:408) reported the basale of the maxilla to have 2 (rarely 3) anterior bristles. The specimen I examined has 2 bristles in that position.

Discussion.—Appendages of male *P. lilljeborgii* collected in the vicinity of either Norway or Sweden have not been described. However, the mandibular basale, maxilla, and 7th limbs of female and male *Philomedes* generally have the same number of bristles. According to Poulsen (1962:348, 349) the male from near Iceland that he referred to *P. lilljeborgii* has only three dorsal bristles on the mandibular basale, one anterior bristle on the basale of the maxilla, and 27–30 bristles on the 7th limb. These are outside the range of variability of these characters on female *P. lilljeborgii*; therefore, I here refer Poulsen's male to *Species Inquirenda*. Poulsen (1962:346) also referred a juvenile female to *P. lilljeborgii* but only gave its length; therefore, I here refer that specimen also to *Species Inquirenda*.

In a key to species of *Philomedes*, Chavtur (1983:38–40) separated *P. lilljeborgii* from other species by its having eight dorsal bristles on the mandibular basale. That number is outside the five to seven bristles that have been reported on specimens from Denmark and Sweden.

In their description of *P. bonneti* collected off Mauritania at a depth of 1120 m, Kornicker and Caraion (1977:15) listed for *P. bonneti* the following characters that separate *P. bonneti* from *P. lilljeborgii*: minute digitations along the posterior edge of the caudal process, five dorsal bristles on the mandibular basale, and nine bristles on the 7th limb. In the present study of *P. lilljeborgii*, minute digitations were observed (at

high resolution, $\times 20$ objective, $\times 15$ eye-piece) along the posterior edge of the caudal process, and the variability of the number of dorsal bristles on the mandibular basale and on the 7th limb was found to include the number of bristles on those appendages of *P. bonneti*. That species, therefore, is here referred to *P. lilljeborgii*. The length of the single female measured by Kornicker and Caraion (1977:10) was 1.99 mm, smaller than females of *P. lilljeborgii* from Norway and Sweden (2.15–2.6 mm).

Cypridinidae Baird, 1850

Discussion.—The single specimen upon which the new species here described is based, is an adult female belonging to either the genus *Doloria* Skogsberg, 1920:223, or *Paradoloria* Hanai, 1974:119. Because the two genera can be separated only by morphological differences in adult males it is not possible with certainty to refer the new species to either genus. I have referred it to *Doloria* because it resembles in many characters the type species (*D. levis*) of *Doloria*.

Genus *Doloria* Skogsberg, 1920

Type species.—*Cypridina (Doloria) levis* Skogsberg, 1920:225.

Doloria sarsi, new species Figs. 2e–k, 3

Etymology.—For G. O. Sars.

Holotype.—Adult female; unique specimen from vial R. M. S. 125, Naturhistoriska Rikmuseet, Stockholm, Sweden.

Type locality.—Koster Fiord, Lerbotton, Skagerrak, west coast of Sweden, depth 100 fm (182.9 m); collected 5 Aug 1865.

Distribution.—Known only from type locality.

Description of adult female (Figs. 2e–k, 3).—Carapace smooth, oval in lateral view with posteroventral caudal process not marked by abrupt change in curvature (Fig. 2e, g, j); incisur small, at valve midheight;

anterior edge and tip of rostrum unusual in having a lip folding inward (visible best in medial view at high resolution (with $\times 10$ objective, $15\times$ eyepiece; Fig. 2f, i).

Infold: Broad in area of rostrum, caudal process, and ventral to incisur, becoming narrower elsewhere (Fig. 2f, g, j). Bristles of rostral infold mostly missing on specimen but indicated by sockets on left valve (Fig. 2i); 2 unequal bristles at inner end of incisur (Fig. 2f, i); anteroventral infold with about 10 bifurcate bristles (several more indicated by sockets); broad list along anterior edge of caudal process with smooth posterior edge and minute inwardly oriented spine-like processes; list of caudal process of left valve terminating dorsally in round knob (Fig. 2j, k); list of caudal process of right valve terminating at ventral end of ridge along inner edge of posterodorsal infold (Fig. 2g, h); dorsal part of broad selvage of caudal process of right valve posterior to list with depression with convex dorsal margin (Fig. 2g, h). Infold of caudal process of right valve broader than that of left valve.

Selvage: Lamellar prolongation present along anterior and ventral margins of valves, absent along posterior margin; prolongation divided at inner end of incisur; prolongation along anteroventral margin with minute spines along edge, elsewhere edge smooth.

Locking device: When posterior edges of lateral outlines of drawings of left and right valves are superimposed, the rounded knob at dorsal end of list of caudal process of left valve (Fig. 2k) appears to lie within depression posterior to dorsal end of list of caudal process of right valve (Fig. 2h) suggesting a locking device possibly useful for aligning valves.

Size: Holotype, length 2.67 mm, height 1.87 mm.

First antenna (Fig. 3a, b): 1st joint bare. 2nd joint with small hairs forming rows along dorsal margin. 3rd joint short, with 2 bristles bearing short marginal spines (dorsal bristle proximal with base about $\frac{1}{3}$ length

of joint from proximal suture of joint, ventral bristle terminal). 4th joint elongate with 2 terminal bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 10 long stout proximal filaments (proximal 4 filaments with tips missing, remaining 6 filaments about $\frac{1}{2}$ length of stem), 2 slender short distal filaments, and bifurcate tip. 6th joint with short medial bristle. 7th joint: a-bristle spinous, slightly longer than bristle of 6th joint; b-bristle about $\frac{2}{3}$ length of sensory bristle of 5th joint, with 5 short marginal filaments, some pectinate; c-bristle $\frac{1}{3}$ longer than sensory bristle, with 8 marginal filaments, and bifurcate tip. 8th joint: d- and e-bristles longer than b-bristle, bare with blunt tips; f-bristle same length as c-bristle, with 8 marginal filaments (some pectinate) and bifurcate tip; g-bristle longer than f-bristle, with 11 marginal filaments (some pectinate), and bifurcate tip.

Second antenna (Fig. 3c): Protopodite with small spinous medial bristle. Endopodite 3-jointed: 1st joint with 4 proximal bristles (3 short, 1 long) and 1 long distal bristle; 2nd joint elongate, bare; 3rd joint small, well defined from 2nd joint by suture, with long terminal filament. Exopodite: bristle of 2nd joint reaching just past 9th joint, with 19–23 slender ventral spines (spines longer distally), and no dorsal hairs or spines on left limb but some slender dorsal spines on right limb, tip of bristle with terminal papilla; bristles of joints 3–8 with natatory hairs, no spines; 9th joint with 4 bristles (3 long, 1 short), all with natatory hairs, no spines; joints 2–8 with basal spines; spine of 8th joint about $\frac{1}{2}$ length of 9th joint; 9th joint with lateral spine longer than joint.

Mandible (Fig. 3d): Coxale endite tapering to point, spinous, with terminal spines not markedly stouter than others; small bristle near base of endite. Basale: ventral margin with 2 a-bristles, 1 small b-bristle, 2 c-bristles, and 2 d-bristles; dorsal margin with 1 midbristle (with short marginal spines) and 2 terminal bristles with short marginal spines. Exopodite hirsute, reach-



ing past distal end of dorsal margin of 1st endopodial joint, with 2 distal bristles, both with short marginal spines, proximal bristle longer. 1st endopodial joint with few terminal spines on dorsal margin and 4 ventral bristles (2 long, 2 short on left limb, 1 long, 3 short on right limb (aberrant), all with marginal spines). 2nd endopodial joint: medial surface with few small distal spines; ventral margin with small spines and 3 slender bristles forming 2 groups of 1 and 2 bristles (medial and lateral bristle of distal pair about same diameter); dorsal margin with 6 long bristles followed by 1 short bristle (all with short marginal spines) and 14 cleaning-type bristles (6 with stout marginal spines, 8 with slender marginal spines) (dorsal bristles not shown on illustrated limb). End joint with 3 bare claws with hook-like tips (dorsal claw shorter than others) and 4 bristles (no bristles with broad proximal part).

Maxilla (Fig. 3e-h): Endite I broad with 8 spinous terminal bristles and claws; endite II narrow with 6 spinous terminal bristles and claws; endite III narrow with 1 slender proximal bristle (outline of bristle shown on Fig. 3e), 2 distal bristles on anterior edge, 1 short terminal claw, and 2 terminal bristles. Coxale with fringe of dorsal hairs and hirsute dorsal bristle. Basale with 4-6 bristles: 1 terminal (with long hairs) on ventral margin, 1 short bristle on distal edge near ventral margin, and 2-4 terminal bristles on dorsal margin. Exopodite with 3 bristles (1 proximal, 2 terminal). 1st endopodial joint with 2 alpha-bristles, 2 beta-bristles (longest pectinate), and dorsal hairs; cutting

tooth weakly developed with slightly digitate edge. 2nd endopodial joint with 3 a-bristles, 2 small claw-like b-bristles, 2 or 3 short ringed b-bristles (3rd b-bristles could be interpreted to be 4th a-bristle), 2 stout ringed c-bristles, and 3 stout, curved, non-pectinate claw-like d-bristles (Fig. 3h).

Fifth limb (Fig. 3i-l): Tooth not observed on protopodite. Endite I with 7 spinous bristles; endite II with 2 spinous and 3 pectinate bristles; endite III with 3 bristles at inner corner (additional bristles obscure). 1st exopodial joint: main tooth with triangular peg (illustrated left limb probably aberrant in not having peg present on right limb) and 6 constituent teeth (secondary marginal teeth mostly bifurcate); spinous bristle proximal to peg. 2nd endopodial joint with spinous posterior c-bristle, spinous anterior d-bristle, 4 pectinate a-bristles, and total of 8 b- and b'-bristles; additional anterior bristles obscure on specimen. Inner lobe of 3rd exopodial joint undeveloped, with 2 bristles (1 with long hairs, other with short spines); outer lobe hirsute, with 2 bristles with long proximal hairs and short distal spines. 4th and 5th exopodial joints fused, hirsute, with 2 terminal bristles (outer with long proximal hairs and short distal spines, inner with long hairs). Epipodite incomplete, remaining part with 52 hirsute bristles.

Sixth limb (Fig. 3m): Epipodite with 2 or 3 bare bristles. Endite I with 2 short hirsute medial bristles and 2 long terminal bristles (1 with long proximal and short distal spines, other with long spines to tip); endite II with 2 short hirsute medial bristles and 2 long

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Fig. 3. *Doloria sarsi*, adult female, holotype: a, Left 1st antenna; b, Same, showing bristles of joints 7 and 8; c, Distal part of protopodite and endopodite of right 2nd antenna; d, Left mandible, dorsal bristles of 2nd endopodial joint not shown; e, Left maxilla, medial view, not all bristles shown; f, Right maxilla, lateral view, not all bristles shown; g, Same, endites I-III; h, Same, 3 stout d-bristles of end joint; i, Left 5th limb, posterior view; j, Same, endites I-III; k, Posterior view of right 5th limb showing peg and 2 proximal teeth of 1st exopodial joint; l, Same, exopodial joints 3-5 (joints 4 and 5 fused); m, Left 6th limb; n, Tip of 7th limb; o, Posterior of body showing genital ring (stippled), unextruded eggs (dashed circles), left lamella of furca, Y-sclerite and girdle; p, Anterior of body showing medial eye and Bellonci organ, rounded anterior process, lateral eye, and upper lip.

terminal bristles with long proximal and short distal spines; endite III with 1 medial bristle with long proximal and short distal spines, and 3 terminal bristles (1 or 2 with short spines, 1 or 2 with long proximal and short distal spines); endite IV with 3 or 4 bristles (2 with short marginal spines, 1 or 2 with long proximal and short distal spines). End joint with 14 bristles: 2 posterior bristles plumose; next 2 bristles with long proximal hairs and short distal spines; except for 2nd bristle from anterior end, which has only short spines, next 7 bristles along edge long, with long proximal and short distal spines; 3 short bristles on anterior half of joint with bases on lateral side of edge, with short marginal spines; lateral side of edge with long spines (spines absent between 2 posterior plumose bristles); medial surface of joint hirsute.

Seventh limb (Fig. 3n): Terminal segment with 10 bristles on comb side and 8 on jaw side; some bristles obscured on proximal segments, 10 observed on comb side, and 8 on peg side; total observed bristles 36 but more probably present. Comb comprising long central tooth with 4 slightly shorter teeth (with rounded tips and pointed alar projections near midlength) and 4 short teeth (with square tips) on each side; total number of comb teeth about 17. Jaw opposite comb resembling cupped palm with about 9 teeth along edge (lateral profile in Fig. 3n); muscles capable of actuating jaw illustrated in Fig. 3n.

Furca (Fig. 3o): Each lamella with 11 claws decreasing in width and length posteriorly along lamella; right lamella slightly anterior to left; all claws with teeth along posterior edge.

Bellonci organ (Fig. 3p): Short, cylindrical with rounded tip, with about 15 narrow rings near tip (not all rings shown in illustration).

Eyes: Lateral eyes well developed with about 20 ommatidia in field of dark pigment (Fig. 3p). Medial eye unpigmented (Fig. 3p).

Upper lip (Fig. 3p): In lateral view an-

teroverventral margin of undivided part evenly rounded and bearing numerous small glandular openings; divided glandular part bearing small glandular openings; minute tusk bearing single glandular opening lateral to posterior end of divided part; posterior of lip evenly rounded, hirsute.

Genitalia (Fig. 3o): Comprising oval ring on each side of body anterior to furca.

Posterior of body (Fig. 3o): Evenly rounded.

Y-sclerite (Fig. 3o): Indistinct but seemingly typical for subfamily.

Eggs (Fig. 3o): Each side of body with cluster of 8 small unextruded eggs (16 total).

Comparisons.—*Doloria sarsi* resembles *D. levis* in that both species have the following combination of characters: dorsal bristle of the 3rd joint of the 1st antenna close to the 2nd joint, only three bristles on the ventral margin of the 2nd endopodial joint of the mandible, three claw-like nonpectinate d-bristles on the end joint of the maxilla, only two bristles on the fused 4th and 5th exopodial joints of the 5th limb, a toothed jaw opposite the comb of the 7th limb, and 11 claws on the furca. *Doloria sarsi* differs from *D. levis* in having two to four anterior bristles instead of only one on the basale of the maxilla. *Doloria levis* is known only from the vicinity of South Georgia and the continental subregion of Antarctica (Kornicker 1975:102). *Paradoloria acorensis* (Granata and Caporiacco, 1949:7) [the male of the species is unknown; thus, the species could belong in *Doloria*] is not well known; it is from the Azores (1482 m) and Bay of Biscay (1455 m) and differs from *D. sarsi* in having 12 instead of 11 furcal claws. Other species of *Doloria* and *Paradoloria* differ from *D. sarsi* in having more than two bristles on the fused 4th and 5th exopodial joints of the 5th limb, as well as in other characters. Poulsen (1962:147) stated that *Cypridina gracilis* Brady (1880: 156) (from the Azores, 1829 m) may possibly be included in *Paradoloria*. The large

size of that species (length 5 mm) clearly distinguishes it from *D. sarsi* (length 2.67 mm).

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